Fescue Management Considerations

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During the past two years, ISU Extension and the Rathbun Lake Forage Project have sponsored a series of meetings to discuss current management recommendations for southern Iowa fescue pastures. This May, we invited Dr. Craig Roberts from the University of Missouri to update us at three producer meetings and one veterinarian in-service. Over 120 producers and practitioners attended these sessions. This article will review some of the highlights from Dr. Roberts' presentations.

Is the fescue endophyte a health or a nutritional problem? It is important to realize that while you can manage grass to have higher protein or higher energy, if you do not deal with managing around the alkaloid toxins produced by fescue, you still will not have good animal performance. Fescue toxicosis is a health issue, not a nutritional issue! Many sets of data show that cattle on endophyte infected Kentucky-31 will gain 30-50% less than cattle grazing the same varieties of endophyte free or novel-endophyte fescues. Beef cow studies often show a 20-30% reduction in pregnancy rates with average management on high endophyte pastures. These studies are with local origin cattle – cattle introduced to fescue pastures from non-fescue regions can expect more severe results!

Once you realize we need to manage not only yield and forage quality, but also the toxin levels, it may change your outlook on when and how to use fescue. Intake of fescue alkaloid levels are highest when fescue is rapidly growing – especially late May and June when fescue grows a stem and seed heads. Alkaloids also can be high during early fall pasture growth. Dr, Roberts recommends if you have highly infected pastures, it may pay to rotate the cattle to other forage sources when fescue matures in the spring and when you get a flush of fall growth. Use the fescue heavily in early spring, try to keep seed heads and stems from emerging, and use the fall growth as a stockpiled feed for winter grazing.

You may choose to harvest hay from fescue pastures that are maturing. That allows you to manage the use of the infected hay. Missouri data indicates allowing mowed fescue to sun cure and harvest as big bales can reduce the alkaloid levels 50% from what was in the fresh grass pasture. Some Missouri producers are also ammoniating fescue hay to improve quality and detoxify the hay.

Other tips from the fescue management workshops include:

*Test your pastures for the level of endophyte infection using the new Elisa test developed in Georgia – check www.agrinostics.com for more information.

*If you have a severe problem, replant to new forages, by killing the fescue with Roundup, and either farming two years of row crops or seeding annual forage crops in

fescue sod with a spray/smother/spray renovation plan. After you reduce the seed bank and current tillers of the infected pastures, you can reseed to your new pasture mix. Dr. Roberts is very high on the new novel-endophyte fescue varieties, fescue that have a special endophyte that does not produce alkaloid toxins. Jesup/Max-Q is the only variety currently commercially available.

*If you do not want to replace the fescue pasture, manage what is there by adding practices that dilute or reduces the amount of alkaloid consumed, including rotating to other pastures or hay fields, adding legumes to the pasture (frost seeding), supplementing the cattle with grain or grain co-products, ammoniating fescue hay, clipping pastures, and using stockpiled fescue in the winter. You also should be careful in adding nitrogen fertilizer to fescue pastures – nitrogen addition will increase the concentration of alkaloids.

*It is critical to have a good mineral program that supplies a highly available source of microminerals that are deficient in our region, so nutrition does not further complicate cattle health and performance. There is no definitive evidence that adding antibiotics, enzymes or seaweed extract to minerals has any impact on the toxins produced by infected fescue through increased daily gain or improved pregnancy rates. There may be secondary benefits from these additives, but it is yet to be proved they really directly reduce the impact of the endophyte.

Dr. Roberts emphasized that managing fescue is hard, "boring" work that really involves high levels of management with practices we know about and using plants that we easily can grow in Iowa. There really is no magic bullet or exotic plant that will solve all your fescue alkaloid problems. Contact me at 641-774-2016 or sellers@iastate.edu if you want more information.

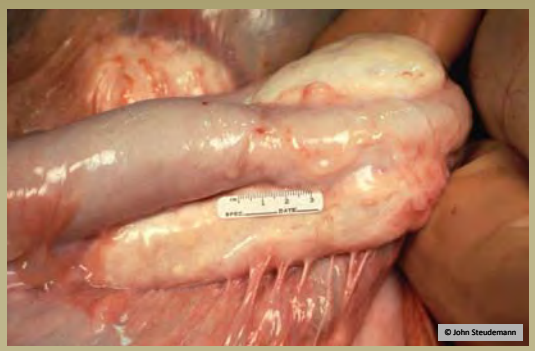
Fescue Toxicosis *and* Management

Craig Roberts
University of Missouri

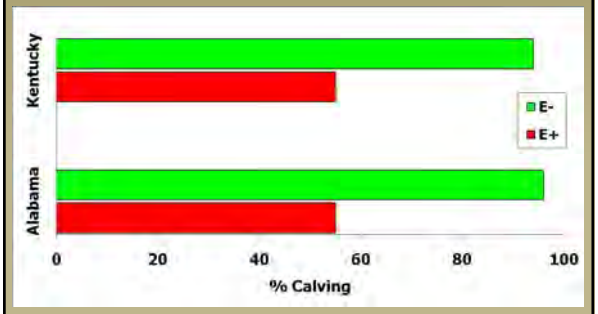
Fescue Toxicosis

Fescue Toxicosis

- Vasoconstriction (narrowing of blood vessels)
- Fescue foot
- Poor thermoregulation
- Low feed intake
- Low rate of gain
- Dystocia (birthing problems) and poor reproduction
- Aglactia (poor milk production)



	E+ lb/day	E- lb/day
Texas	0.99	2.14
Alabama	1.41	2.18
Georgia	1.02	1.31
Alabama	1.00	1.83
Missouri	0.97	1.41
Alabama (seed)	0.44	2.12
Alabama (hay)	0.62	1.46



Schmidt, 1986; Gay, 1988

Does not include economic losses to dairy, horses, sheep.

Does not include impact on wildlife.

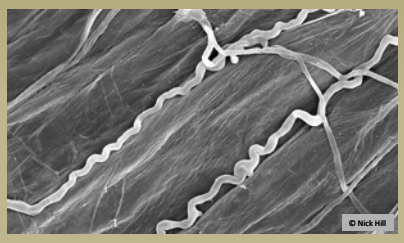
Potential Impact to Missouri Beef Industry

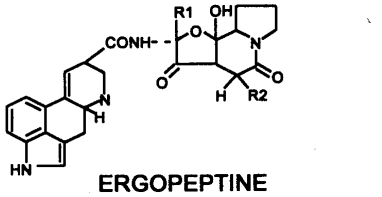
Stockers:
$30 million /year

Cow-calf:
$130 million /year

The Cause

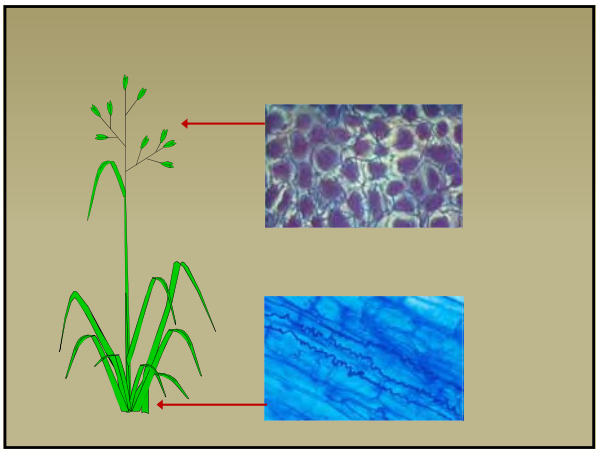
Tall Fescue:
the endophye and its toxins

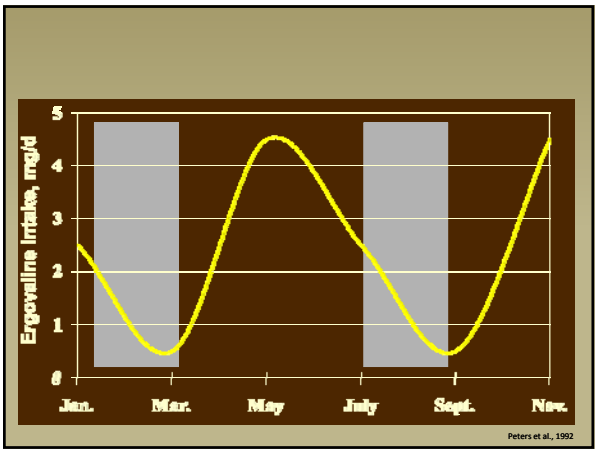




ERGOPEPTINE STRUCTURE

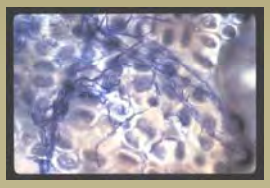
R2 \ R1	METHYL	ETHYL	ISOPROPYL
ISOPROPYL	ERGOVALINE	ERGONINE	ERGOCORNINE
ISOBUTYL	ERGOSINE	ERGOPTINE	ERGOCRYPTINE
ISOPHENYL	ERGOTAMINE	ERGOSTINE	ERGOCRISTINE





Management

Test!


Seed

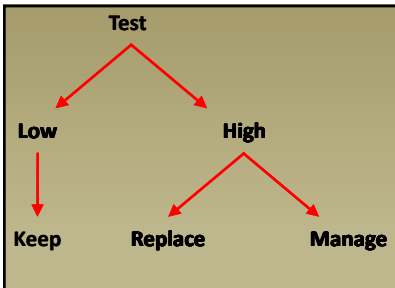

Sheath

Test!


Seed


Tillers

www.agrinostics.com



Endophyte-free

Biotic stresses

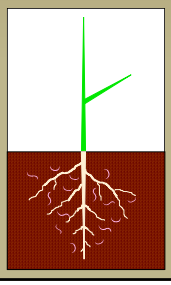
- Nematodes
- Fungi
- Bacteria
- Viruses
- Insects
- Overgrazing

Roberts et al, 1992

Endophyte-free

Abiotic and synergistic stresses

- Plant is susceptible to drought
- Nematodes eat roots



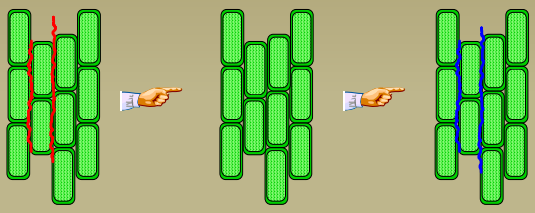
Endophyte-free

Morphology affected by endophyte

- Leaf growth
- Tillering
- Root growth

Tall Fescue:

three types



toxic endophyte

endophyte-**free**

novel endophyte

Novel Endophyte Cultivars

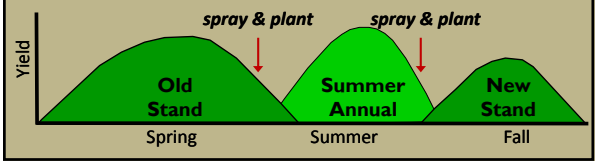
- **Jesup (MaxQ)**
  Pennington + AgResearch NZ + University of Georiga
- **BarOptima (E34+)**
  Barenbrug
- **Texoma**
  Noble Foundation + AgResearch NZ
- **Duramax (Armor)**
  DLF and University of Arkansas
- **(ArkShield)**
  Mt. View Seed + University of Arkansas and Missouri
- **Cultivar from UKY**

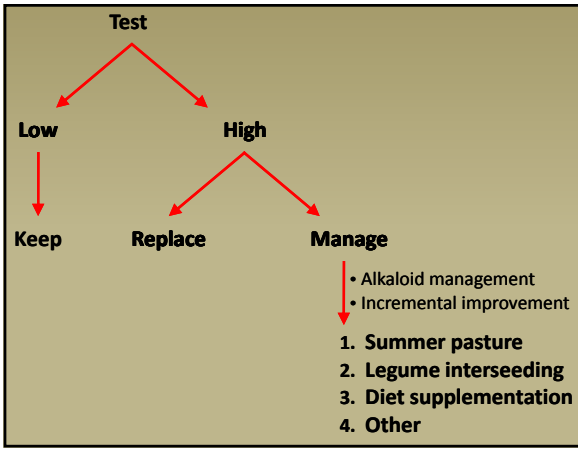
Tall Fescue:

steer gains on three types

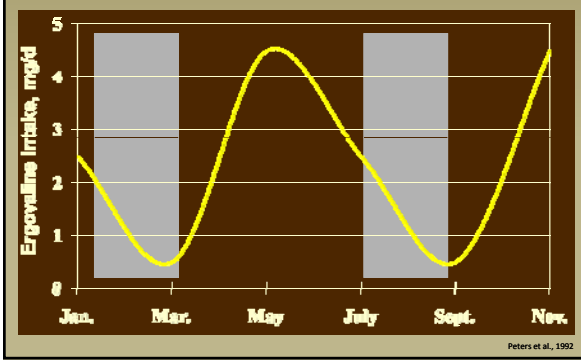
	1999	2000
	------- lb/d -------	
Toxic endopyte	0.73	0.50
Endophyte-free	1.26	1.56
Novel endophyte	1.30	1.54

- Experiment with small acreage
- Plan for fall plant if possible (Sept. 1 for mid-MO)
- If replacing E+ KY31, may clip seed heads in spring
- Also if replacing E+ KY31, "spray-smother-spray"
- Add legumes later (except for BFT)
- 15 lb/A drilled; 1/8" deep
- Add N for "pop-up" (30 to 40 lb/A)

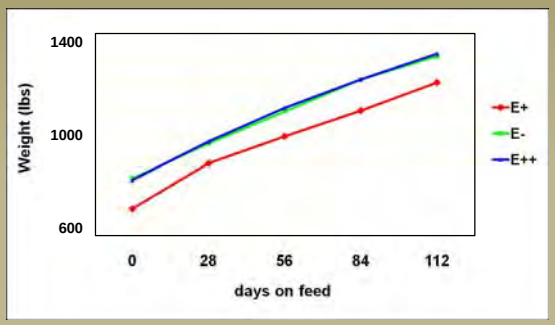




Alkaloid Management!



Peters et al., 1992

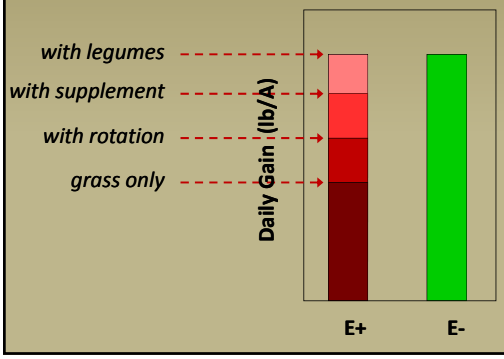


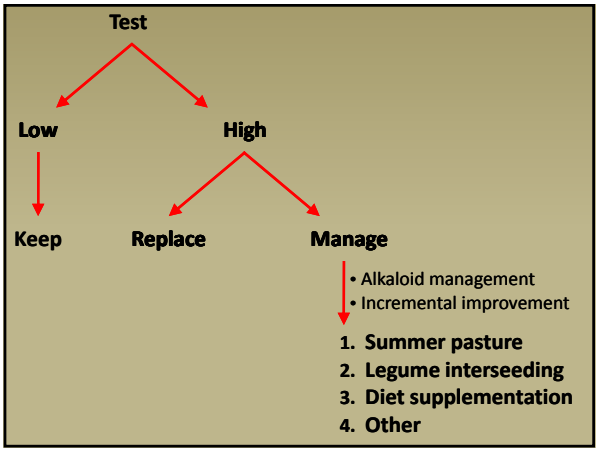
Duckett et al., 2001

Alkaloid Management!

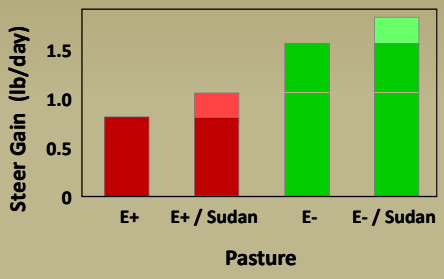
- **In endophyte** (replant)
- **In plant** (fertilizers, seasonal, anatomical)
- **In pasture** (dilution, rotations)
- **In diet** (ammoniation, supplementation)

Incremental Alleviation





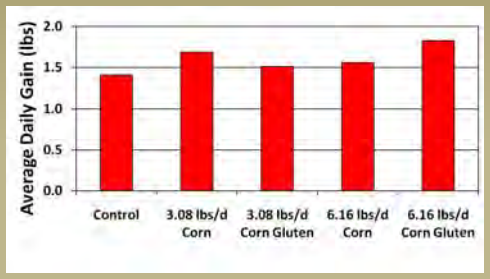
1. Rotate to Summer Pasture



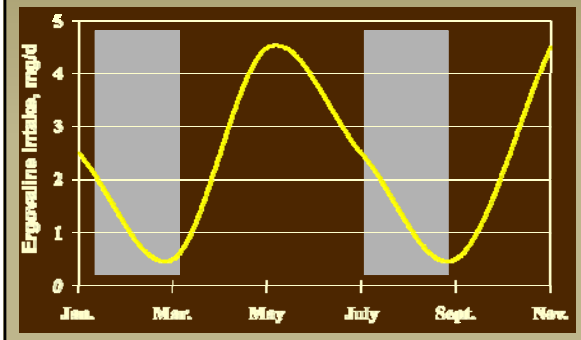
2. Dilute the Field

- **Tall fescue**
- **Smooth bromegrass**
- **Orchardgrass**
- **Red clover**
- **White clover**
- **Birdsfoot trefoil**

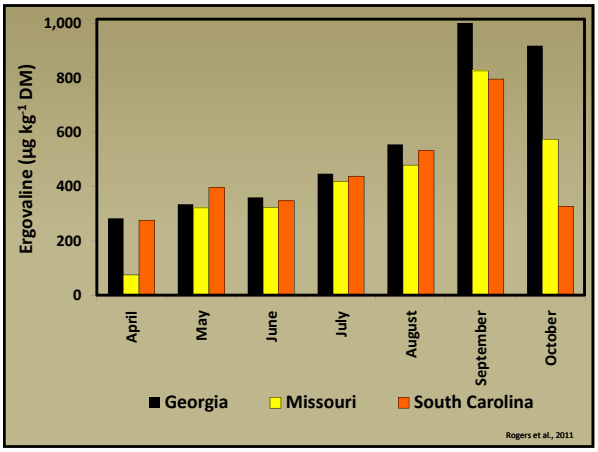
3. Supplement the Diet



Clipping



Peters et al., 1992



Rogers et al., 2011

Careful Fertilization

- Nitrogen increases alkaloid concentration
- High nitrogen associated with toxicosis

	Nitrogen Fertilizer (lb/acre)		
	0	60	120
	------- Ergovaline (ppb) -------		
Leaf	258	306	485
Stem and Sheath	494	561	1,003
Seedhead	895	1,050	1,488

Rottinghaus et al., 1991

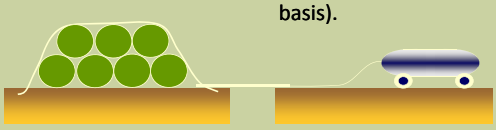
Ammoniation

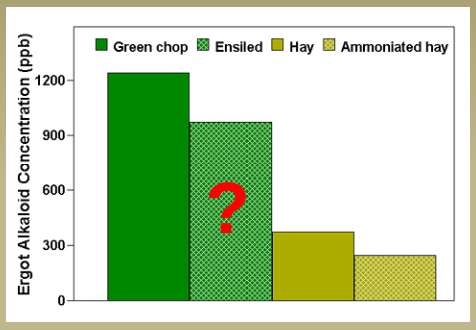
1. Weigh and stack hay.

N used in feed improvement.

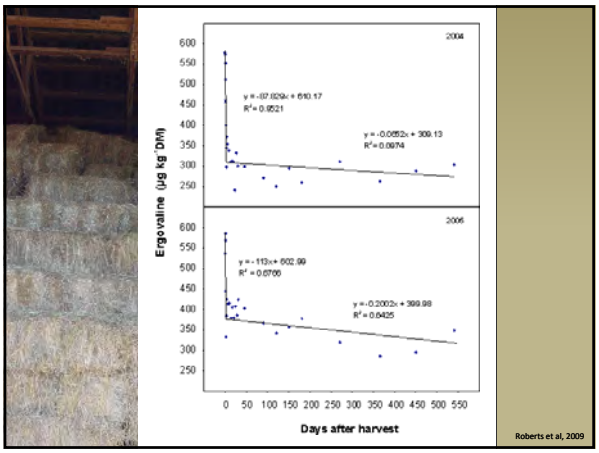
2. Cover with heavy plastic, bury edge.

3. Treat with anhydrous ammonia at 3% (weight basis).

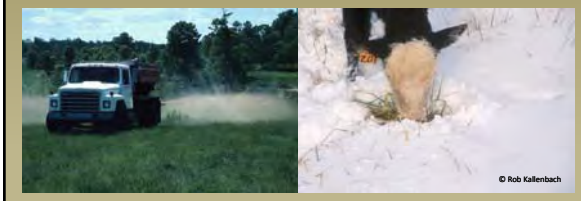


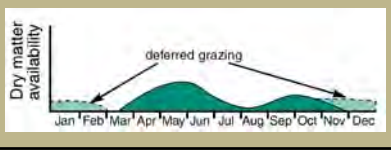


Roberts et al, 2002



Graze Stockpile Late Winter





Kallenbach et al, 2003

What We Still Don't Understand

Toxins
- Toxicity of ergovaline vs. total ergot alkaloids?

Plants/Fungi
- Persistence in novel endophytes

Livestock
- Animal susceptibility—how much does it vary?
- Milk production?

Management
- Residual effects in livestock?
- Reproduction in spring vs. fall calving (on E+)
- "System economics" for stockers and dairy

What We Do Understand

Toxins
- Ergot alkaloids from endophyte

Plants/Fungi
- Persistence from standard endophyte

Livestock
- Production, reproduction, milk production, etc.

Management
- Good system for general livestock production